

Medical Science

25(115), September, 2021

To Cite:

Almutairi FA, Alanazi AA, Almansour MM, Almansour IM, Shaikh SF, Al-Rashaid H, Baseer MA. Knowledge, attitude, and diagnostic ability of oral cancer among dental students in Riyadh, Saudi Arabia. Medical Science, 2021, 25(115), 2364-2372

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Peer-Review History

Received: 08 August 2021

Reviewed & Revised: 10/August/2021 to 08/September/2021

Accepted: 10 September 2021

Published: September 2021

Peer-review Method

External peer-review was done through double-blind method.

Knowledge, attitude, and diagnostic ability of oral cancer among dental students in Riyadh, Saudi Arabia

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ABSTRACT

Aim: To assess the awareness, knowledge, attitude, and diagnostic ability of oral cancer and its early signs and risk factors among undergraduate dental students in Riyadh, Saudi Arabia. **Material and method:** In this cross-sectional study a total of 468 participants responded to a close-ended online questionnaire consisting of 24 pre-tested items on oral examination, risk factors of oral malignancies, and their attitude towards the oral cancer approach. The relationship between the questionnaire items and characteristics of the study participants (academic year and gender) was assessed using the Chi-square and Kruskal-Wallis tests. **Results:** A high percentage of fifth-year students identified tobacco (30%) and alcohol usage (30.9%), viral infections (30.7%), UV exposure (32.5%), older age (33.5%), poor-fitting denture (31.1%), consumption of spicy foods (37.7%) and low consumption of fruit and vegetables (29.4%) as the risk factors for oral cancer. The knowledge of risk factors of oral cancer was noticed between the 2nd year and 4th year, 2nd year and 5th year dental students did not differ significantly. Similarly, the knowledge of the diagnostic ability between 4th and fifth years students did not differ significantly. In general, the fifth-year students had a higher percentage of correct responses to the items. **Conclusion:** Dental students lacked sufficient knowledge of diagnostic ability in detecting oral cancer. Hence it is necessary to focus on providing knowledge in diagnosing oral cancer patients within the dental schools of Riyadh. Thus, it will help dental students in the proper screening and early diagnosis of oral cancerous lesions.

Keywords: Oral cancer, awareness, dental students, attitude, diagnostic ability

1. INTRODUCTION

Oral cancer is the 11th most common malignancy, affecting the population worldwide (WHO 2005). Oral cancer is gradually increasing every year



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especially in developing nations (Carter and Ogden, 2007; Abdullah Jaber, 2011; Oliveira et al., 2013). Global cancer statistics in 2018 estimated the incidence and mortality rate, which reported 18.1 million new cases and 9.6 million deaths due to cancer worldwide, out of which oropharyngeal cases contributed 0.5% of the mortality (Bray et al., 2018). There has been a significant rise in oral cancer cases in Saudi Arabia, where it is reported as the 3rd most common malignancy (Al-Balawi and Nwoku, 2002). It is the commonest cancer seen in the oral cavity, oropharynx, and lips are squamous cell carcinoma, even though the etiologic and risk factors for each site are different (Argiris et al., 2008; Kumar et al., 2016). It is noticeable that the line of treatment, prognosis, and management approach to these oral cancers, which arise in different anatomical areas, is also different (Chen et al., 2007; Genden et al., 2010; Jan et al., 2011).

As a large percentage of oral cancers are detected at an advanced stage when already invasion and metastasis has occurred, it eventually leads to a high mortality rate associated with its late presentation (Warnakulasuriya, 2009). Moreover, in the advanced stage, the signs and symptoms are much more evident as compared to the initial stage, which is the leading cause behind the delay in cancer screening by health care professionals especially dentists (Neville and Day, 2002). Lack of sufficient knowledge among health care professionals, either due to deficiencies in clinical training or an improper attitude to approach a cancer case, causes a delay in its early diagnosis (Abdullah Jaber, 2011; Ogden and Mahboobi, 2011; Oliveira et al., 2013). As dentists routinely examine the oral cavity from a clinical perspective, their knowledge and diagnostic ability to properly examine early signs and symptoms will play a significant role in detecting oral cancer in its early stage (Horowitz et al., 1996). Hence, early detection in the initial stage and timely management of oral cancer will lead to a better prognosis and drastically improve the outcome in the patients (Friedrich, 2010; van der Waal, 2013). This positive impact can be achieved if health professionals, especially dentists, examine the early signs and symptoms with proper history to change the course of disease progression (Baykul et al., 2010; Gómez et al., 2010).

Several studies have shown that due to dentists' inadequate knowledge and negative attitude, they were unable to diagnose cancer in its initial stage when survival rates could have been increased (Abdullah Jaber, 2011). There have been several variations in the results of oral cancer awareness studies in different nations. The available information about the diagnosis of oral cancer by dental students is inadequate and unsatisfactory to derive a proper conclusion concerning their overall understanding of oral cancer among different academic undergraduate students (Carter and Ogden, 2007; Abdullah Jaber, 2011). Hence, the present study aims to bridge the gap seen in previous studies and investigate the knowledge of dental students in Riyadh regarding the risk factors, their diagnostic ability, and attitudes regarding oral cancer.

2 MATERIALS AND METHOD

A cross-sectional survey was carried out among the dental students in eight dental schools located in Riyadh in July, 2020. Ethical approval for the present study was obtained from the Ethics Committee of Majmaah University (MUREC-June.17/COM-2020/33-2). Written informed consent was obtained from participants after explaining the purpose of the study. The study duration ranged between June-2020 to October 2020.

Sample size

The students from all seven dental colleges located in Riyadh City were invited to participate in the study. A sample of 377 students was calculated based on the margin of error (5%), confidence level (95%), and a response distribution of (50%). However, a total of 468 students responded to the study questionnaire.

The study proforma included the gender and academic year details of the study participants. The Pre-validated structured questionnaire was administered. The questionnaire was categorized into three sections. Section 1 assessed the knowledge of participants about oral cancer risk through 8 items. This part elicited responses in (Yes), (No), and (I do not know). Section 2 assessed the knowledge of the diagnostic ability of dentists to detect oral cancer. Knowledge regarding common clinical features and diagnostic procedures of oral cancer was evaluated. It involved eight multiple-choice questions with one correct answer. Section 3 assessed the attitude of the participants towards oral cancer based on eight statements, which were included to check their approach when dealing with oral malignancy strictly. It included their current knowledge about oral cancer, how effectively they pay attention to the associated risk factors, other questions, including advising patients for a specialist referral (oral pathologist/ maxillofacial surgeon/ general physician) to increase the probability of an early diagnosis. For all items, the respondent had to choose a response using a five-point Likert scale ranging from strongly agree=5, neutral=3 to strongly disagree=1.

Questionnaire validity and reliability

The questionnaire items were derived after a thorough review of the literature. The face validity of the questionnaire was established by taking the expert opinion of oral and maxillofacial faculty and corrections were made accordingly. A pilot study conducted among 20 dental students showed that the adequate reliability of the questionnaire (Cronbachs $\alpha=0.83$).

Questionnaire administration

A Google-form-based questionnaire was created, and the link was posted on the social media platform of dental colleges. Clear instructions were provided to the participants at beginning of the questionnaire. The investigator bias was taken into consideration by collecting questionnaire information without the personal identifiers of the participants.

Statistical analysis

The data was collected and analyzed using a Statistical Package for Social sciences version 20.0 (IBM Corp, Armonk, NY, USA). The discrete variables were represented with frequency (percent). The knowledge scores were assigned to each question based on the correct answer; correct answer as score one and incorrect or no answer was assigned as score 0. The quantification of the responses of attitude was done on a five-point Likert scale. Association between the groups was performed using the Chi-square test and comparison using the Kruskal-Wallis test. Statistical significance was considered at $p \leq 0.05$.

3 RESULTS

The study consisted of 468 participants (263 females and 205 males) among those 134 students who were of the second year, 101 third year, 102 fourth year, and 131 fifth year. To test their knowledge and awareness of oral cancer participating dental students were questioned about risk factors and diagnostic methods. Of the participants, a high percentage of fifth-year students identified tobacco (30%) and alcohol usage (30.9%), viral infections (30.7%), UV exposure (32.5%), older age (33.5%), poor-fitting denture (31.1%), consumption of spicy foods (37.7%) and poor intake of fruit and vegetables (29.4%) as the risk factors for oral cancer occurrence. Old age, alcohol consumption, tobacco use, exposure to direct sunlight, Human papillomavirus infection, consumption of spicy foods, poorly fitting dentures, and low consumption of vegetables and fruit as risk factors for oral cancer showed significant differences across different academic years of study participants ($p < 0.05$) (Table 1).

Table 1 Study participants knowledge of oral cancer in different academic years of education

Questions		Academic year				Total N(%)=468	p*
		2nd year n(%)=134	3rd year n(%)=101	4th year n(%)=102	5th year n(%)=131		
Consumption of spicy foods is considered as a risk factor of oral cancer	Yes	24 (18.5%)	30 (23.1%)	27 (20.8%)	49 (37.7%)	130 (100.0%)	0.004
	No	74 (31.5%)	44 (18.7%)	51 (21.7%)	66 (28.1%)	235 (100.0%)	
	Don't know	36 (35.0%)	27 (26.2%)	24 (23.3%)	16 (15.5%)	103 (100.0%)	
Exposure to direct sunlight is considered as a risk factor of oral cancer	Yes	56 (22.8%)	43 (17.5%)	67 (27.2%)	80 (32.5%)	246 (100.0%)	0.001
	No	47 (30.3%)	39 (25.2%)	26 (16.8%)	43 (27.7%)	155 (100.0%)	
	Don't know	31 (46.3%)	19 (28.4%)	9 (13.4%)	8 (11.9%)	67 (100.0%)	
Alcohol consumption is considered as a risk factor of oral cancer	Yes	96 (26.0%)	76 (20.6%)	83 (22.5%)	114 (30.9%)	369 (100.0%)	0.01
	No	14 (25.0%)	16 (28.6%)	15 (26.8%)	11 (19.6%)	56 (100.0%)	
	Don't know	24 (55.8%)	9 (20.9%)	4 (9.3%)	6 (14.0%)	43 (100.0%)	
The use of tobacco is considered as a risk factor of oral cancer	Yes	115 (27.4%)	85 (20.3%)	93 (22.2%)	126 (30.1%)	419 (100.0%)	0.000
	No	4 (18.2%)	12 (54.5%)	4 (18.2%)	2 (9.1%)	22 (100.0%)	
	Don't know	15 (55.6%)	4 (14.8%)	5 (18.5%)	3 (11.1%)	27 (100.0%)	
Low consumption of fruits and vegetables is considered as a risk factor of oral cancer	Yes	30 (29.4%)	25 (24.5%)	17 (16.7%)	30 (29.4%)	102 (100.0%)	0.000
	No	54 (23.0%)	56 (23.8%)	55 (23.4%)	70 (29.8%)	235 (100.0%)	
	Don't know	50 (38.2%)	20 (15.3%)	30 (22.9%)	31 (23.7%)	131 (100.0%)	

Human papillomavirus is considered as a risk factor of oral cancer	Yes	63(22.0%)	61(21.3%)	75(26.1%)	88(30.7%)	2857(100.0%)	0.021
	No	18(26.9%)	23(34.3%)	9(13.4%)	17(25.4%)	67(100.0%)	
	Don't know	53(46.5%)	17(14.9%)	18(15.8%)	26(22.8%)	114(100.0%)	
Consumption of spicy foods is considered as a risk factor of oral cancer	Yes	24(18.5%)	30(23.1%)	27(20.8%)	49(37.7%)	130(100.0%)	0.032
	No	74(31.5%)	44(18.7%)	51(21.7%)	66(28.1%)	235(100.0%)	
	Don't know	36(35.0%)	27(26.2%)	24(23.3%)	16(15.5%)	103(100.0%)	
Poorly fitting dentures are considered as a risk factor of oral cancer	Yes	47(26.1%)	45(25.0%)	32(17.8%)	56(31.1%)	180(100.0%)	0.002
	No	43(21.6%)	36(18.1%)	54(27.1%)	66(33.2%)	199(100.0%)	
	Don't know	44(49.4%)	20(22.5%)	16(18.0%)	9(10.1%)	89(100.0%)	

*Chi-Square test, Sig.2 tailed, $p < 0.05$

The diagnostic ability of the oral cancer was elicited by asking eight items to the study participants. Most of the study participants mentioned the tongue as the common site for oral cancer 171(36.53%), tobacco consumption is the common cause of oral cancer 240 (51.28%), 40-60 years age group has a higher rate of oral cancer 274 (58.54%), and squamous cell carcinoma as the common type of oral cancer 347 (74.14%). Similarly, the majority of the study participants identified oral cancer lesions as a small, painless, white ulcer 205 (43.80%), lateral surface of the tongue has a higher occurrence rate of oral cancer 272 (58.11%), leukoplakia predisposes to a cancerous lesion 302 (64.52%) and both chewing and smoking tobacco likely to cause oral cancer 263 (56.19%). The study participant's knowledge on the items of diagnostic ability of cancer showed significant differences across academic years ($p < 0.05$) (Table 2).

Table 2 Study participants Knowledge on the diagnostic ability of cancer in different academic years of education

Questions		Academic year				Total n(%)=468	p*
		2nd year n(%)=134	3rd year n(%)=101	4th year n(%)=102	5th year n(%)=131		
What is the most common site of oral cancer?	Buccal mucosa	38(31.9%)	28(23.5%)	24(20.2%)	29(24.4%)	119(100.0%)	0.013
	Floor of the mouth	35(29.9%)	24(20.5%)	26(22.2%)	32(27.4%)	117(100.0%)	
	Soft palate	28(45.9%)	17(27.9%)	8(13.1%)	8(13.1%)	61(100.0%)	
	Tongue	33(19.3%)	32(18.7%)	44(25.7%)	62(36.3%)	171(100.0%)	
What is the most common cause of oral cancer?	Alcohol	22 (40.7%)	15(27.8%)	7(13.0%)	10(18.5%)	54 (100.0%)	0.031
	Family history of cancer	18(23.4%)	11(14.3%)	25(32.5%)	23(29.9%)	77(100.0%)	
	Human papillomavirus (HPV)	31(32.0%)	23(23.7%)	20(20.6%)	23(23.7%)	97(100.0%)	
	Tobacco	63(26.3%)	52(21.7%)	50(20.8%)	75(31.3%)	240(100.0%)	
Which age group has a higher rate of oral cancer?	10-20	9 (75.0%)	0 (0.0%)	2 (16.7%)	1 (8.3%)	12(100.0%)	0.007
	20-40	14(27.5%)	20(39.2%)	9(17.6%)	8 (15.7%)	51(100.0%)	
	40-60	77(28.1%)	61(22.3%)	58(21.2%)	78(28.5%)	274(100.0%)	
	60-80	34(26.0%)	20(15.3%)	33(25.2%)	44(33.6%)	131(100.0%)	
What is the most common form of oral cancer?	Lymphoma	20(51.3%)	13(33.3%)	2(5.1%)	4(10.3%)	39(100.0%)	0.000
	Melanoma	12(32.4%)	10(27.0%)	12(32.4%)	3(8.1%)	37(100.0%)	
	Sarcoma	23(51.1%)	8(17.8%)	3(6.7%)	11(24.4%)	45(100.0%)	
	Squamous cell carcinoma (SCC)	79(22.8%)	70(20.2%)	85(24.5%)	113(32.6%)	347(100.0%)	
What is the usual	Small, painful, red	24(27.9%)	24(27.9%)	11(12.8%)	27(31.4%)	86(100.0%)	0.032

initial presentation of oral cancer?	ulcer						
	Small, painful, white ulcer	26(36.1%)	24(33.3%)	12(16.7%)	10(13.9%)	72(100.0%)	
	Small, painless, red ulcer	22(21.0%)	18(17.1%)	31(29.5%)	34(32.4%)	105(100.0%)	
	Small, painless, white ulcer	62(30.2%1)	35(17.1%)	48(23.4%)	60(29.3%)	205(100.0%)	
Which part of the tongue has a higher occurrence of oral cancer?	Dorsal surface	36 (35.6%)	33 (32.7%)	15(14.9%)	17(16.8%)	101 (100.0%)	0.006
	Lateral surface	63(23.2%)	45(16.5%)	74(27.2%)	90(33.1%)	272(100.0%)	
	Tip of tongue	13(54.2%)	5(20.8%)	4(16.7%)	2(8.3%)	24(100.0%)	
	Ventral surface	22(31.0%)	18(25.4%)	9(12.7%)	22(31.0%)	71(100.0%)	
What is the most common precancerous oral lesion?	Candidiasis	24(36.9%)	14(21.5%)	10(15.4%)	17(26.2%)	65(100.0%)	0.003
	Leucoplakia	69(22.8%)	63(20.9%)	73(24.2%)	97(32.1%)	302(100.0%)	
	Oral lichen planus	21(31.8%)	18(27.3%)	15(22.7%)	12(18.2%)	66(100.0%)	
	Stomatitis	20(57.1%)	6(17.1%)	4(11.4%)	5(14.3%)	35(100.0%)	
Which of the following is more likely to cause oral cancer?	Smoking tobacco	22(38.6%)	14(24.6%)	12(21.1%)	9(15.8%)	57(100.0%)	0.002
	Chewing tobacco	22(18.0%)	25(20.5%)	29(23.8%)	46(37.7%)	122(100.0%)	
	Both	73(27.8%)	57(21.7%)	60(22.8%)	73(27.8%)	263(100.0%)	
	I don't know	17(65.4%)	5(19.2%)	1(3.8%)	3(11.5%)	26(100.0%)	

*Chi-Square test, Sig.2 tailed, $p < 0.05$

The positive attitude of the study participants was obtained by combining the agree and strongly agree to responses to the questionnaire items. Study participants demonstrated a positive attitude towards obtaining information on the prevention and detection of oral cancer 145 (30.98%), performing an oral cancer examination 119 (25.42%), confidence and ability to diagnose oral cancer 108 (23.07%), and being prepared to explain the risks of tobacco use to patients 280 (59.82%). The attitude items, I have sufficient information on the prevention and detection of oral cancer, I am adequately trained to perform an oral cancer examination, I am confident in my ability to diagnose oral cancer and I am prepared to explain the risks of tobacco use to patients showed a statistically significant difference across different academic years ($p < 0.05$). Similarly, study participants showed a positive attitude towards expanding knowledge of oral cancer 309(66.02%), referral of oral cancer patients to the oral pathologist 324 (69.23%) oral and maxillofacial surgeon 202 (43.16%) and general physician 94 (20.08%). However, attitude responses to the items, I am interested in expanding my knowledge of oral cancer, I will refer patients with oral cancer to an oral pathologist, oral and maxillofacial surgeon, and a general physician did not show any significant difference across academic years of the study participants ($p > 0.05$) (Table 3).

Table 3 Study participants attitude towards oral cancerin different academic years of education							
Questions		Academic year				Total n(%)=468	p*
		2nd year n(%)=134	3rd year n(%)=101	4th year n(%)=102	5th year n(%)=131		
I have sufficient information on the prevention and detection of oral cancer	Strongly Disagree	18(50.0%)	13(25.0%)	2(5.6%)	7(19.4%)	36(100.0%)	0.000
	Disagree	37(38.1%)	28(28.9%)	16(16.5%)	16(16.5%)	97(100.0%)	
	Neutral	54(28.4%)	45(23.7%)	44(23.2%)	47(24.7%)	190(100.0%)	
	Agree	14(12.7%)	15(13.6%)	37(33.6%)	44(40.0%)	110(100.0%)	
	Strongly agree	11(31.4%)	4(11.4%)	3(8.6%)	17(48.6%)	35(100.0%)	
I am adequately trained to perform an oral cancer examination	Strongly Disagree	39(45.3%)	24(27.9%)	8(9.3%)	15(17.4%)	86(100.0%)	0.021
	Disagree	38(33.3%)	25(21.9%)	21(18.4%)	30(26.3%)	114(100.0%)	
	Neutral	37(25.7%)	28(19.4%)	43(29.9%)	36(25.0%)	144(100.0%)	
	Agree	11(13.9%)	17(21.5%)	19(24.1%)	32(40.5%)	79(100.0%)	

	Strongly agree	9(20.0%)	7(15.6%)	11(24.4%)	18(40.0%)	40(100.0%)	
I am confident in my ability to diagnose oral cancer	Strongly Disagree	33(51.6%)	15(23.4%)	7(10.9%)	9(14.1%)	45(100.0%)	0.003
	Disagree	38(29.9%)	29(22.8%)	29(22.8%)	31(24.4%)	127(100.0%)	
	Neutral	39(23.1%)	32(18.9%)	45(26.6%)	53(31.4%)	169(100.0%)	
	Agree	15(20.3%)	20(27.0%)	17(23.0%)	22(29.7%)	74(100.0%)	
	Strongly agree	9(26.5%)	5(14.7%)	4(11.8%)	16(47.1%)	34(100.0%)	
I am prepared to explain the risks of tobacco use to patients	Strongly Disagree	19(67.9%)	5(17.9%)	2(7.1%)	2(7.1%)	28(100.0%)	0.000
	Disagree	20(39.2%)	12(23.5%1)	4(7.8%)	15(29.4%)	51(100.0%)	
	Neutral	40(36.7%)	22(20.2%)	25(22.9%)	22(20.2%)	109(100.0%)	
	Agree	27(21.3%)	28(22.0%)	40(31.5%)	32(25.2%)	127(100.0%)	
	Strongly agree	28(18.3%)	34(22.2%)	31(20.3%)	60(39.2%)	153(100.0%)	
I am interested in expanding my knowledge of oral cancer	Strongly Disagree	7(36.8%)	4(21.1%)	2(10.5%)	6(31.6%)	19(100.0%)	0.513
	Disagree	14(31.8%)	11(25.0%)	6(13.6%)	13(29.5%)	44(100.0%)	
	Neutral	30(31.3%)	15(15.6%)	24(25.0%)	27(28.1%)	96(100.0%)	
	Agree	15(18.8%)	17(21.3%)	22(27.5%)	26(32.5%)	80(100.0%)	
	Strongly agree	68(29.7%)	54(23.6%)	48(21.0%)	59(25.8%)	229(100.0%)	
I will refer patients with oral cancer to an oral pathologist	Strongly Disagree	13(40.6%)	7(21.9%)	7(21.9%)	5(15.6%)	32(100.0%)	0.056
	Disagree	12(37.5%)	9(28.1%)	7(21.9%)	4(12.5%)	32(100.0%)	
	Neutral	32(40.0%)	16(20.0%)	16(20.0%)	16(20.0%)	80(100.0%)	
	Agree	21(26.9%)	15(19.2%)	20(25.6%)	22(28.2%)	78(100.0%)	
	Strongly agree	56(22.8%)	54(22.0%)	52(21.1%)	84(34.1%)	246(100.0%)	
I will refer patients with oral cancer to an oral and maxillofacial surgeon	Strongly Disagree	17(29.3%)	12(20.7%)	14(24.1%)	15(25.9%)	58(100.0%)	0.299
	Disagree	22(25.3%)	26(29.9%)	21(24.1%)	18(20.7%)	87(100.0%)	
	Neutral	44(36.4%)	18(14.9%)	23(19.0%)	36(29.8%)	121(100.0%)	
	Agree	23(30.7%)	15(20.0%)	15(20.0%)	22(29.3%)	75(100.0%)	
	Strongly agree	28(22.0%)	30(23.6%)	29(22.8%)	40(31.5%)	127(100.0%)	
I will refer patients with oral cancer to a general physician	Strongly Disagree	49(26.5%)	42(22.7%)	38(20.5%)	56(30.3%)	185(100.0%)	0.433
	Disagree	26(28.6%)	19(20.9%)	25(27.5%)	21(23.1%)	91(100.0%)	
	Neutral	39(39.8%)	17(17.3%)	17(17.3%)	25(25.5%)	98(100.0%)	
	Agree	8(18.2%)	11(25.0%)	11(25.0%)	14(31.8%)	44(100.0%)	
	Strongly agree	12(24.0%)	12(24.0%)	11(22.0%)	15(30.0%)	50(100.0%)	

*Chi-Square test, Sig.2 tailed, $p < 0.05$

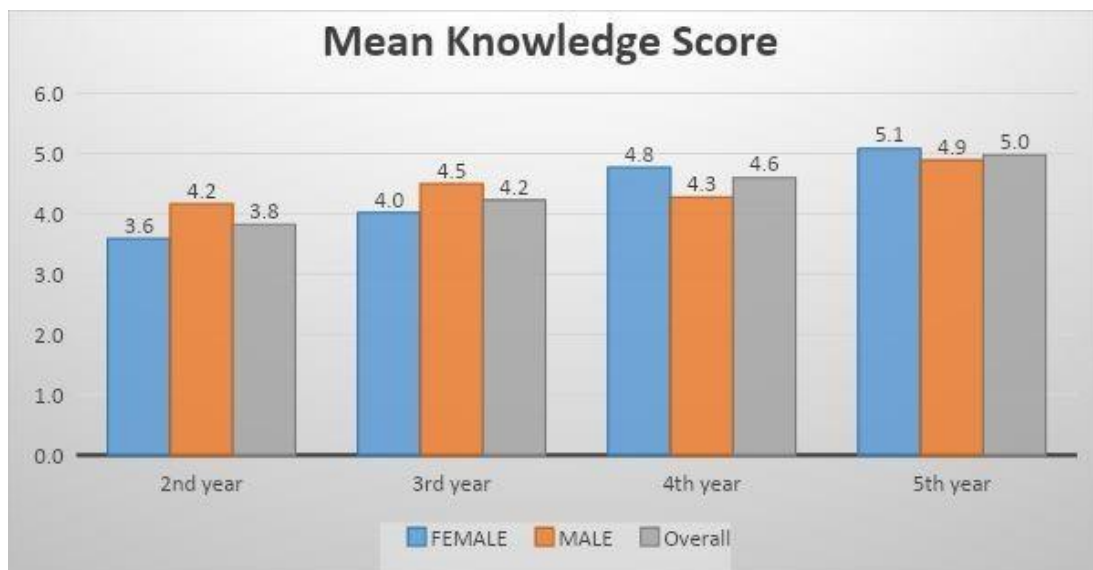


Figure 1 Comparison of knowledge domain between both genders, academic year wise

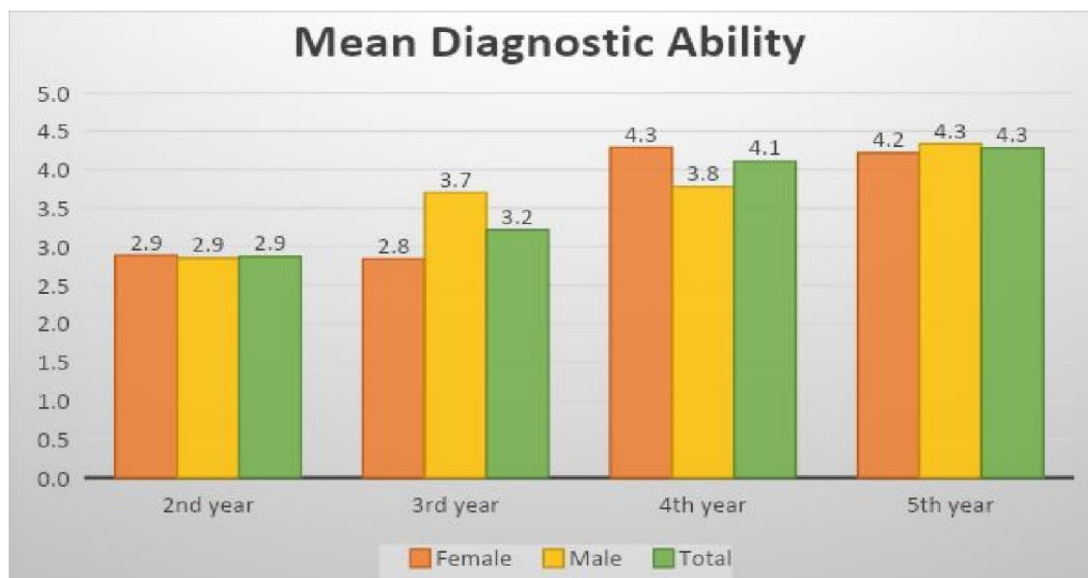


Figure 2 Comparison of diagnostic ability domain between both genders, academic year

Figures 1 and 2 show the comparison of knowledge and diagnostic ability domain, respectively, between both genders, academic year-wise. The mean knowledge score is higher in the fifth year, with 4.9 and 5.2 mean values between males and females, respectively. The mean diagnostic ability score is higher in the fifth year with a mean value of 5.2 and 4.9 between females and males, respectively.

4. DISCUSSION

Oral Cancer is globally advancing at an alarming rate, so the role of health care professionals in its screening and early detection is of utmost importance. Their knowledge, attitudes, and diagnostic ability is a critical determining factor in the prevention and timely diagnosing initial manifestations of oral cancer, thus leading to a dramatic reduction in mortality and morbidity rate (Horowitz et al., 2000). Dental student awareness in all these aspects plays a very crucial role, especially in developing countries (Zohoori et al., 2012; Shrivastava et al., 2014). As all the eight dental schools located in Riyadh were considered in this survey, therefore the sample size was large enough to devise a meaningful conclusion regarding the selected parameters. During their second year, dental students are mostly taught about oral disorders, including oral cancer. In the present study, we approached students of the 2nd, 3rd, fourth, and 5th-year levels to evaluate the dental student's knowledge and diagnostic ability and their attitude concerning oral cancer.

The knowledge of oral cancer risk factors was significantly high among both males and females of all the academic years in this study as the majority of the students reported smoking tobacco and alcohol consumption as the leading risk factor affecting oral cancer prognosis. It is well researched that exposure to tobacco carcinogens and excessive intake of alcohol is the major cause of oral cancer (da Silva et al., 2012). The results show that dental students had a good level of awareness and knowledge regarding these two main risk factors. This is in an agreement with Brazilian studies (Soares et al., 2014). In the present study, 70% of the students indicated old age as a risk factor, a percentage like this is also reported in a previous study (Hassona et al., 2016). More than half of males and female dental students identified exposure to direct sunlight and Human papillomavirus as the underlying risk for oral cancer; similar findings were observed in a past study (Carter and Ogden, 2007).

Poor dietary intake of fruits and vegetables, consumption of spicy foods, and poorly fitting dentures as a risk factor for oral cancer were reported at a decreasing percentage by both male and female dental students of all the academic years. This is in an agreement with another study (Gajendra et al., 2006). There was no significant difference in the overall knowledge of clinical characteristics among male and female dental students of all academic years. More than half of students from all the academic years were unable to identify the usual initial presentation of oral cancer in our study which is in line with the Jordanian study (Sallam et al., 2019). This lack of knowledge among dental students in Riyadh can cause a delay in detecting the initial stage of oral cancer, leading to an unfavorable outcome. More exposure to oral cancer patients in clinical postings will influence the understanding of its clinical presentation and impact their diagnostic skills. This is in an agreement with studies where dental students and health care professionals performed better in detecting early signs and symptoms of cancer when during their clinical training, they interacted with a varied number of such cancer cases (Hassona et al., 2016).

To promote adequate practical and theoretical knowledge among all the academic year, proper intervention and training should be included, which will give them a better sense of judgment in detecting oral cancer. In this study, dental student's awareness regarding the associated risk factors with oral cancer was much better than their overall knowledge in oral cancer diagnosis. This demands our attention to find meaningful ways by which there can be an improvement in their practical and clinical skills, especially among second-and third-year students. The attitude of the dental students is a guiding parameter to assess how much significance they give to the clinical and theoretical aspects of oral cancer. Most of the males and females of all the academic years answered that they have adequate knowledge regarding risk factors (mainly tobacco consumption) and are aware of the prevention and detection of oral cancer. This correlates with their assessment taken regarding the risk factors associated with oral cancer, seen in another study too (Patton et al., 2005). Above half of the dental students from all the academic year accepted that they are not adequately trained to perform an oral cancer examination and lacked the confidence to diagnose oral cancer. This signifies that a robust approach should be taken to revamp their educational curriculum, which is in alignment with findings in previous studies (Alaizari and Al-Maweri, 2014).

There are some limitations present in the study since it was based on questionnaire methodology, there is a probability that social desirability bias may come into the picture, where their responses were based on their own beliefs and notion and are more acceptable. However, as these questions did not have any involvement with their graduation process, so the answers present their actual diagnostic ability, knowledge, and attitude regarding oral cancer. Non-response error is also taken into consideration even though the questionnaires were prepared clearly and concisely, after a pilot testing.

5. CONCLUSION

It is seen in the present study that dental students lacked sufficient knowledge concerning diagnostic ability in detecting oral cancer. This should be given prime importance in all the dental schools in Riyadh as it will help them in screening oral cancer and promote early-stage diagnosis. Training courses, seminars, and interactive sessions should be organized and be a part of the dental curriculum.

Contribution

Fahad Amer Almutairi: conception and design of the study, acquisition of data, analysis and interpretation of data, drafting the article, final approval

Abdulelah Abdulrahman Alanazi: Acquisition of data, drafting the article, final approval

Moath Mansour Almansour: Acquisition of data, revising the paper, final approval

Ibraheem Mansour Almansour: Interpretation of data, revising the article, final approval

Saleem Faiz Shaikh: Acquisition of data, analysis, and interpretation of data, final approval

Hisham AlRashaid: Acquisition of data, analysis, and interpretation of data, final approval

Baseer MA: Analysis and interpretation of data, drafting the article, final approval

Ethical approval

The study was approved by the Ethics Committee of Majmaah University (MUREC-June.17/COM-2020/33-2).

Conflicts of interest

The authors declare that they have no conflict of interest.

Funding

This study has not received any external funding.

Data and materials availability

All data associated with this study are present in the paper.

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